

Chapter Ten: Maintenance

Adequate knowledge of the operation and maintenance of the Tower Tech TTXL Series Modular Cooling Tower will ensure efficient and safe operation. Failure to follow these instructions may result in poor cooling performance, and unnecessary equipment failure. The operation, maintenance and repair of this equipment should be undertaken only by qualified personnel. All such personnel should be thoroughly familiar with the equipment, the associated system and controls, and all procedures dealing with the handling, lifting, installation, operation, maintenance, and repair of this equipment to prevent personal injury and/or property damage.

Tower Tech offers the highest quality replacement parts, materials and services to help customers keep their TTXL Series Modular Cooling Towers operating at peak performance. For details refer to the *Maintenance & Service Plans* brochure located in the flap inside the front cover of this Manual. The brochure describes our Preventive Maintenance Inspection (PMI), Preventive Maintenance Service (PMS), and Service Inspection (SI). Refer to Figure 35.



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Figure 35 - Brochure: Maintenance & Service Plans



Component	Maintenance Frequency	Action To Be Taken	Reference Section
Shell Surfaces	12 months	Visual Inspection for leaks, warping, surface damage	None
Drift Eliminators	12 months	Visual Inspection/Cleaning*	10.1.1
Fill Media	12 months	Visual Inspection/Cleaning*	10.1.2
Rotary Spray Nozzles	6 months	Visual Inspection	10.1.3
Fan Guards	1 month	Visual Inspection/Cleaning*	10.1.4
Fan Blade Clearance	1 month	Visual Inspection	10.1.5
Fan Motors	1 month **	Turn On Briefly	10.1.9
Fan Motors	12 months	Amp/Volt Check	None
Fan Motors	6 months	Visual Inspection	10.1.9
Mechanical Float Valve	3 months	Visual Inspection	10.1.10
Sump Screen	1 month	Visual Inspection/Cleaning*	10.1.11
Immersion Basin Heater	12 months (prior to cold season)	Visual Inspection/Cleaning*	10.1.12
Water Collection System	6 months	Visual Inspection/Cleaning*	10.1.13

^{*} As required.

Table 12 - TTXL Maintenance Schedule

10.1.1 Drift Eliminators

TTXL Series Modular Cooling Towers utilize a low-pressure three pass drift eliminator that is impervious to rot, decay or biological attack. An ultraviolet inhibitor is manufactured into the product to extend life expectancy. Drift eliminators, however, should be inspected once a year (in conjunction with the nozzle inspection). The drift eliminators should be free from any build-up of mud or debris. If cleaning is required, the following procedure should be followed:

1. Remove the drift eliminators. Place gently on an elevated platform or on the ground.

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- 2. Wash the eliminators by spraying with a low-pressure water hose.
- 3. Turn the eliminators over and spray until remaining debris is removed.
- 4. Insert the eliminators back into place in the cooling tower.

^{**} Required only if tower is not operated regularly for an extended period of time.



Recommended nozzle operating range is 100 gpm to 300 gpm (6.3 lps to 18.9 lps). Damage to nozzles will occur if operated below 100 gpm (6.3 lps) and above 320 gpm (18.9 lps). NOTE: Tower module hydraulic limits may be exceeded if nozzle is operated above 300 gpm (18.9 lps); consult Tower Tech engineering manager before attempting operation above 300 gpm (18.9 lps) per nozzle.

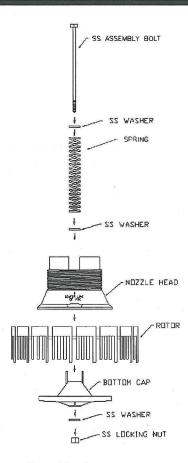


Figure 36 - Exploded View of Rotary Spray Nozzle

The Rotary Spray Nozzle uses a compressed spring. Attempting to disassemble the Rotary Spray Nozzle may cause serious injury. Tower Tech sells replacement Rotary Spray Nozzles as complete assemblies only. Disassembly of Rotary Spray Nozzle voids nozzle warranty.

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3. Unbolt the screen from the hinge by removing the three remaining 1/4" bolts.

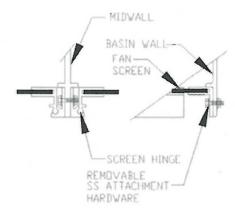
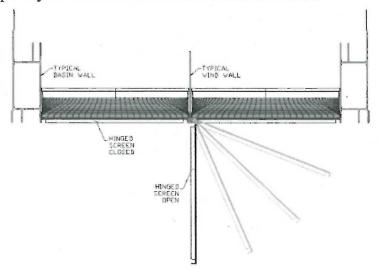


Figure 37 - Close-Up: Fan Guard Hardware

To lower a fan guard (refer to Figure 38):

- 1. Turn off fan and lock and tag out power.
- 2. Remove the six 1/4" bolts that hold the screen angle to the tower mid basin and perimeter wall using a 7/16" wrench.
- 3. At this point you will have full access to the fan and motor.



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Figure 38 - Opening Fan Guard



10.1.6 Fan Blade Replacement

Individual fan blades should not be replaced without rebalancing the fan. Replace the fan if damage occurs to the blades.

- 1. Complete steps 1 thru 9 from Checking & Re-Pitching Fan Blades (see Section 10.1.7).
- 2. Transfer the index tab to replacement fan blade, and place new fan blade into bottom of fan shell half making sure that it is correctly orientated.
- 3. Proceed with steps 11 thru 19 from Checking & Re-Pitching Fan Blades (see Section 10.1.7).
- 4. Check fan balance and rebalance fan assembly if needed.

10.1.7 Fan Blade Pitch Adjustment

- 1. Verify the direction of rotation of the fan with fan operating before removing the fan guard screen.
- 2. Lock out/tag out the electrical power supply to the fan motors.
- 3. Remove the fan guard screens from the cells to be worked on.
- 4. Place a protractor or digital level with degree marks on the upper side of the flat part of the blade, close to the stem, where the blade should have the embossed word "Multi-Wing" on it (place level over the top of the letter "G") and record existing pitch (record the average pitch of all blades of the fan). Refer to Table 2 for correct pitch.
- 5. Remove the fan assembly from the motor.
- 6. Record the location and quantity of all balancing washers and nuts holding the hub shell together along with the individual fan blade location on the hub so that you can return all of the parts to their original location.
- 7. Remove the center Uniboss center hub from the fan shell, marking the orientation first.

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8. Remove the bolts that hold the fan shell halves together.



To remove a motor:

- 1. Disconnect power from motor and lock-out and tag-out the motor/fan to be worked on.
- 2. Open fan guard.
- 3. Remove fan.
- 4. Disconnect electrical wiring and conduit.
- 5. Support the weight of the motor.
- 6. Loosen the four bolts that connect the motor to the base plate and remove any shims, making note of their placement.
- 7. Remove the connecting bolts while holding the motor steady.
- 8. Slowly lower the motor to the ground.

CAUTION If any of the wire supplied with a fan motor, junction box or safety disconnect requires replacement, use replacement wire of the same gauge and type.

To install a motor, reverse the above procedure.

10.1.9 Fan Motor Lubrication

Standard motors on TTXL Modular Cooling Tower have sealed bearings. If the tower is not operated regularly for an extended period of time, the motors should be turned on briefly once each month. Refer to Table 11.

10.1.10 Mechanical Float Valve

To remove the float valve:

- 1. Remove sump lid and circular access plate.
- 2. Remove ball and rod assembly from the adjusting arm.



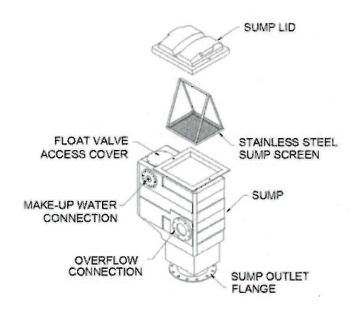
10.1.11 Sump Screen

It is important to visually inspect and document contents retrieved from the sump screen as it can provide valuable information in regards to potential damaging contaminants and preventing their future re-entry into the system. Use a construction start-up screen for extra protection anytime fill media is removed from and reinstalled in the cooling tower.

To remove the sump screen:

- 1. Shut off pump(s).
- 2. Remove sump lid.
- 3. Pull screen out of sump.
- 4. Empty contents of screen.

To install the sump screen, reverse steps 1 through 3.



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Figure 40 - Sump Layout, Sump Screen Detail



The TTXL Series Modular Cooling Tower's Water Collection System is designed so that adjacent fans must be operated in pairs. Thus, in a four-fan tower module, fans #1 and #2 should always operate simultaneously, and fans #3 and #4 should always operate simultaneously.

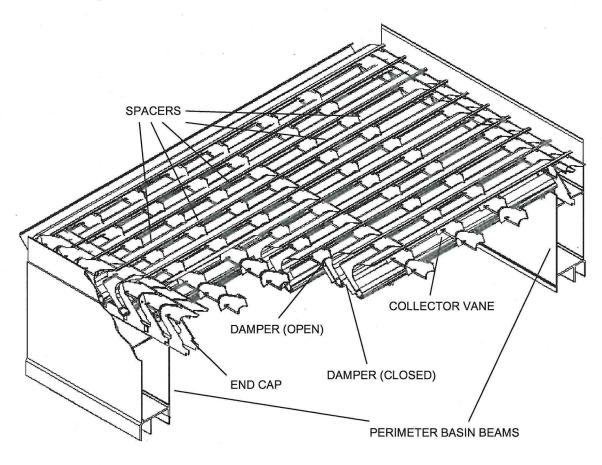


Figure 41 – Water Collection System

The main components of the Water Collection System include:

• Collector Vanes: Each collector vane is approximately eight inches (~20.3 cm) wide and 14 inches (~35.6 cm) high and is installed transversally in the tower module. Collector vanes are a series of overlapping chevron-shaped troughs that capture cooled water falling from the fill media and channel it into the perimeter basin beams. Refer to Figure 41.

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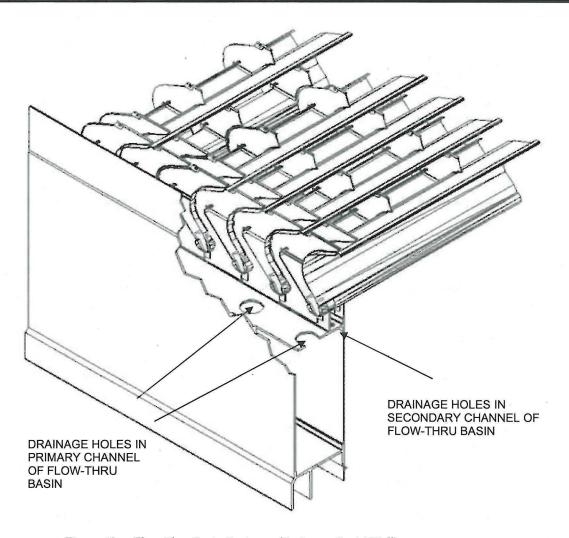


Figure 43 – Flow-Thru Basin Drainage (Perimeter Basin Wall)

• Secondary Drainage Channel Drainage Holes. Each end of a secondary drainage channel has a drainage hole (or notch) located between each pair of end caps. The drainage hole allows any water flowing in a secondary channel to escape into the perimeter basin beam. These holes are hidden from view and can only be felt by hand. If a secondary channel's hole or notch becomes plugged by scale, dirt or debris, water may overflow the secondary channel into the fan area. Refer to Figures 42 and 43.

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If necessary to remove additional scale, dirt and debris, use a straight tool (tilt the tool at a ~75° angle to the direction of the collector vane) by sliding the tool down the entire length of the secondary drainage channel and carefully guiding the tool through the end cap. Locate the notch in the end of the secondary drainage channel by moving the tool gently along the bottom of the secondary drainage channel, then gently dislodge any scale, dirt and debris by pulling toward you and removing it, or by pushing it gently through the notch located near the end of the secondary drainage channel has been sealed with caulking material at the factory; removal of this material during the cleaning process will damage the Water Collection System and result in leaks.

Do not attempt to push or otherwise force the factory-applied caulking material out of the end of the secondary channel. Doing so will damage the Water Collection System and result in leaks.

- 5. Use care to avoid cracking or otherwise damaging a damper or collector vane when removing or installing a damper. After installing a damper, make sure it opens and closes fully and freely.
- 6. Re-seal all end caps and areas where sealant may have been removed during your work, to prevent leakage. Note that during the cleaning process the membranes of sealants and caulks may be breached and may contain small holes that are not easily seen. Always use factory-approved sealants and caulking materials.
- 7. Reinstall the fan (if it was removed) and fan screens in their correct operating positions.
- 8. Remove your lock/tag from the control panel or cooling tower.
- 9. Check for proper operation of each fan and motor, and visually observe each damper for correct operation.

To access and perform service on the upper section of the Water Collection System:

- 1. Shut off water to-from tower module.
- 2. Access to the interior of the tower module is through the top of the module. Remove the drift eliminators over the area of the Water Collection System to be accessed.

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- 7. Reinstall drift eliminators.
- 8. Turn on water to-from tower module.

10.2 Spare Parts

The inherent redundancy and reliability of the TTXL's multiple-fan, direct-drive design assures customers that tower performance and efficiency will not be materially impaired if one motor/fan is offline. This redundancy and reliability, and Tower Tech's stock of readily available parts, enable most customers to avoid stocking spare parts. We recommend the following for customers that prefer to maintain a small spare parts inventory:

Part Description	Single Module Installation	Multiple Module Installation
Fans	1	1
Motors	1	1
Rotary Spray Nozzle	1	1

Table 13 – Recommended Spare Parts Inventory

The customer is responsible for selecting, purchasing, and maintaining a parts inventory consistent with its own needs. Tower Tech stocks most tower parts for immediate shipment. For further information contact a Tower Tech Customer Service Representative at (405) 979-2123 or Service Tower Tech Inc.com.

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